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SEASONAL TENDENCIES IN THE POTATO MARKET DURING THE KAW VALLEY SHIPPING SEASON

E. A. Stokdyk, Specialist in Marketing, Kansas State
Agricultural College

The marketing period for Kaw Valley Potatoes is a rather short one. The Valley starts shipping soon after the South has cleaned up and just before home gardens in the corn belt are mature. Each year the growers are confronted with the question "Should I dig my crop a little immature or let them grow until ripe?" Of course some of the growers with large acreages dig all during the season and the only question in their mind is whether to speed up or retard operations at any time.

In attempting to answer the question as to the best time to dig, a survey was made of the tendencies in the market for the past 7 years. First the prices were averaged by weeks as shown in the upper portion of Chart I. The averages show that during the first two weeks in July which is really the beginning of the shipping season that the market is strong. However, a sharp break takes place after the second week and the market is weak until the middle of August when a temporary recovery takes place lasting for a week or two and followed by a period of weakness.

Averages are sometimes misleading. Therefore, the lower portion of Chart I was constructed to show whether or not the upper portion told a true story. The lower portion shows the number of times that one week was higher than the preceding week. It shows that the third and fourth weeks in July have never shown an advance. It shows that the second week in August has shown an advance three out of four times. By the use of the lower portion of the chart together with the upper portion we are able to point out clearly the periods of strength and weakness.

The data presented are for a period of 4 years. Additional data for 3 years previous have also been worked over. The tendencies shown are the same, but prices were so out of line with average seasons, due to the influence of the war, that it was not advisable to combine them with the chart presented.

It may be of interest to know that the 1925 season market followed the chart tendencies very closely. Price levels were relatively higher but periods of strength and weakness were expressed very definitely.

Reasons for the tendencies can be assigned to each of the periods of strength and weakness. However, such a discussion is a story in itself.

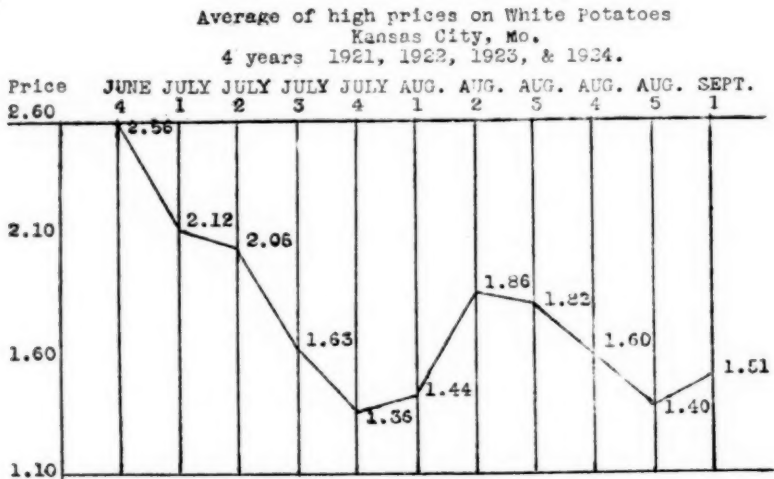


Fig. I — Average of average high prices by weeks.

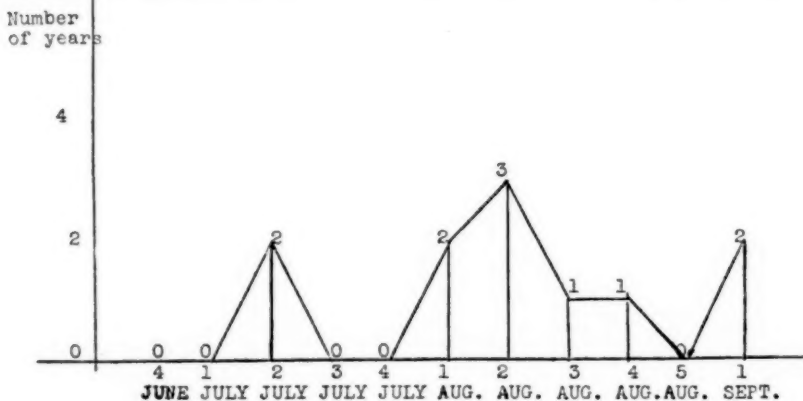


Fig. II — Number of times the prices for any week was higher than for the preceding week.

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H. G. Zuckerman, 216 Drum St., San Francisco, Calif.

The **November Number** will be devoted to general or miscellaneous subjects. Don't forget to send in your contributions early and help make it a real number.

The **December Number** will be devoted to **Fertilizer Problems**. Bailey E. Brown of the Office of Soil Fertility Investigations, U. S. Dept. of Agr., is the chairman of the committee requested to contribute. The **December Number** will be the crowning one of the year.

— NOTICE —

In order to improve the **Potato Notes and Certification Notes**, the following men are requested to obtain information concerning the crop in his province or state and forward the same so that it will reach the editor's desk not later than the morning of the 5th of each month.

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POTATO MARKETING FROM A NEW ANGLE

Daniel Dean

The marketing of every potato crop is a separate economic problem. From the time when the first car rolls from Florida in February or March till the last car leaves the far north in July or August nearly eighteen months later the nearly constant consuming demands of our population must be adjusted by means of variations in prices to widely different conditions of production, storage and utilization. For lack of better adjustment, prices to the grower and to the consumer have fluctuated widely in the past from one season to another, and even within short periods of time within a season.

With the potato, as with other farm crops, wide variations in yield must be expected. The United States averaged only 80 bushels per acre under the poor growing conditions of 1916, and 124 under the more favorable conditions of 1924. Back in the past yields varied as far as from the 63.6 bushels per acre of 1894 to the 102.3 bushels of 1895 when potatoes were nearly unsalable. On more limited areas fluctuations have been even more violent. New York state in 1914, a very favorable season produced 54 million bushels, but in 1915 with a bad epidemic of late blight and rot grew but 22½ million bushels and again in 1916, a bad drought year had the same 22½ million bushels.

These variations in yield and improper distribution methods result in wide fluctuations in price which are detrimental to producer and consumer alike, and are of benefit only to the middleman speculator. In the past, grower and consumer have been at the mercy of the middleman because his business connection gave him much more complete and timely information than the producer and consumer had on the vital facts of production, distribution and consumption. Records of the U. S. Department of Agriculture show dealers nearly always held larger stocks of potatoes in winter in those short crop seasons when prices rose later from the shortage, than in the bumper crop seasons when prices fell.

In the past, prices have varied most in spring, going as high as \$4.00 per bushel after the short crops of 1916 and 1919 and as low as a few cents after some of the big crops. The \$4.00 seed in the spring of 1917 resulted in an acreage jump from 3,565,000 acres in 1916 to 4,384,000 acres in 1917, a jump of over 800,000 acres. Many thousands of people who knew little or nothing about potato growing rushed into the business, bidding up the price of the already short seed supply. Much of the new acreage produced very light yields, but the heavy increase coupled with a normal yield resulted in a record crop which sold at prices far below the cost of production to the growers.

In the past few years losses in potato growing drove growers out of the business, often away from the farm to the already crowded city, till the 1922 acreage of 4,307,000 was cut to 3,453,000

this year, a 20 per cent cut. This year's is the smallest acreage in proportion to the thousand or million of population that has been planted since we have records, nearly sixty years. It is to be feared that the high prices probable for the very short crop of 1925 through next winter and spring will again stimulate the planting of an excessive acreage.

Two lines of progress are indicated for these conditions. One is in the direction of a better control of fluctuations in yield, the second in the direction of better control of distribution. The first is scientific and practical, the other economic.

Control of yield fluctuations is difficult at best under the climatic conditions of eastern North America, where extremes of heat and cold, of drought and excessive rainfall are too common. Only in occasional years, as 1895, 1914 and 1924 are natural conditions favorable enough over wide areas to give heavy yields under extensive methods of production. Such seasons encourage cheap and careless methods which under the poorer conditions of other years result in partial or complete failure.

The potato grower who makes the most money, and who is the most efficient as a national resource for food production is the one who can and does grow good yields in those seasons when because of unfavorable conditions potatoes are scarce and often very high in price. It is a curious paradox of potato growing that the very methods which are most reliable under poor conditions, and which produce the best yields then are not the best for producing the record breaking yields in those years when the climate is most favorable to the potato plant. For example, in southern New York planting by May 15th has been known to give yields of better than 500 bushels per acre in 1909, a favorable cool summer, while in most of the hotter and drier summers which are normal here June planting gives the best yield.

Scientific research has in the past thirty years made available to potato growers a number of means by which the effects of poor growing conditions can be at least partly prevented. Over most of the eastern part of the continent thorough spraying with bordeaux mixture prevents the heavy losses from late blight and rot which occur in wet seasons. Besides reducing yield, this disease causes growers further heavy loss by demoralizing potato markets in the fall and winter till the rot infected stock has disappeared.

Under conditions of heat and drought thorough spraying with bordeaux gives gains not quite so striking as in wet years, but of great value to the grower, as it is the hot and dry years like 1911 and 1916 which often cause the highest potato prices. Insect injury is much worse in hot summers. The leaf-hopper, the aphid, the black flea-beetles are enemies which the progressive grower is now finding to be far more dangerous than the now conquered potato bug. Unlike the bug, which can be checked by the use of arsenicals applied carelessly, these insects require the most thor-

ough spraying methods. Bordeaux mixture and sometimes nicotine applications must be used at very high pressures, with great care to get every plant well covered at each spraying. In the past, spraying has been regarded as a necessary evil, to be postponed or avoided if possible. Over immense areas of our potato production spraying is now coming to be regarded by the best growers as an integral part of the business, just as much as planting or tillage. Strangely enough, my friend F. C. Stewart of Geneva has found that thorough spraying pays least in those very favorable seasons as 1914 when the potato plant can do its best without much assistance from the grower.

The past ten years have seen immense strides in the improvement of seed potatoes. Up to this time progress on the part of growers had been mainly in the direction of finding the best potato types for each potato section, as the Rural group of varieties for the great central potato belt from New York and Pennsylvania to Michigan, Wisconsin and eastern Minnesota, and the Green Mountain varieties in the more northern latitudes best suited to the immense vines of that type.

Now the certified seed industry has become well established. Many thousands of growers in sections where the climate is too hot in summer for best results in producing seed potatoes have learned that it pays to buy their seed from sections where specialization in seed production has succeeded. Like many other growers, the writer has often noticed how the plant diseased with leaf-roll may give a good yield in favorable years, but falls down completely in the poor years which cause high prices for the product later. Just as with spraying, certified seed delivers the goods when delivery means most profits.

Seed disinfection is rapidly gaining ground in many sections. The late and weak hill caused by rhizoctonia sprout injury is nearly useless to the grower in poor conditions, though it may add to a burdensome surplus under good conditions.

The economic side of potato marketing can be vastly improved. Immense progress has been made in recent years in the collection and dissemination of car lot crop movement and of daily price reports by the United States market news service. In view of the wonderful spread of the use of radio, it is to be greatly regretted that the most rapid means of getting market news to the potato grower has been almost entirely neglected. A number of radio broadcasting stations send out the city market news the evening of the same day. This information is of very little use to the potato grower compared with the much more valuable news of the market prices and market conditions in the shipping sections, now more neglected by the radio broadcasting stations.

Most of all, grower and consumer need better, more frequent and more timely estimates of production and of consumption. In these days of the telegraph and the radio it is a poor exhibition of

national efficiency to see crop estimates issued under a handicap of so small appropriations that it takes ten days or more from the time the estimate is made till it is published. In the meantime, the potato speculator uses the telegraph and the long-distance phone. If his business connections in the shipping sections inform him that the crop is shorter than expected, he buys, before the grower can get the government estimate. If the crop is large, the dealer has only to sit still and wait for the fall in price when the government estimate comes. In either case, the speculator has both grower and consumer at his mercy, and can give them the choice "Heads, I win. Tails, you lose." Our present crop estimates are, I believe, a very efficient piece of work, so far as potatoes are concerned. What we also need, and which would be of equal value to the consumer as well, is a system of estimates of stocks on hand through the whole of the consuming period of the main crop. This would be very difficult to get, but would be worth the small cost compared with the far greater cost of not having them.

To show how much we need better, more timely and more complete crop estimates, how many of the potato growers and potato consumers of the United States know these facts?

1.—The present population of the United States, according to the most reliable estimate, that of the Bureau of Economic Research, is almost 116,000,000.

2.—The potato crop estimate of October 1st is 344,227,000 bushels.

3.—This gives a per capita production of less than three bushels, which is the smallest with one exception, that of 1916, for twenty-four years back to the drought year of 1901.

4.—The acreage planted this year is the smallest in proportion to population for nearly sixty years. The present crop estimate is nearly up to normal, and the shortage is caused by short planting.

5.—In spite of the short crop, it has been going into consumption at a very rapid rate. Last spring the southern crop, owing to the warm winter, ripened up very early. Before the normal time for beginning shipment from the northern main crop regions which must furnish all the supplies through the winter and a large part of the spring and early summer supplies in 1926, the shortage in the second early sections forced heavy digging in Maine, Minnesota and other main crop regions. Unless weather conditions in the south next spring should be unusually favorable, it is certain that the present supplies of potatoes will run short, as they did in 1916 and 1919.

6.—European countries have a strict quarantine against American potatoes to prevent the potato bug from crossing the ocean. Canada quarantines against Europe to prevent the importation of the worst potato disease, wart. When the short crop of 1911 raised potato prices heavy imports were brought from Europe, and with

it the spread of the wart disease in a few areas of the United States, which has taken considerable trouble to keep in check. It will be interesting this winter to see the efforts made by interested parties to get heavy potato imports from Europe, in spite of the national danger from imported disease.

AN ANALYSIS OF FEDERAL RECEIVING POINT INSPECTION CERTIFICATES ON LATE CROP POTATOES

F. G. Robb, Specialist in Inspection

The use of the Federal Food Products Inspection Service is voluntary on the part of shippers, carriers and receivers of perishable farm products. Only those cars are inspected upon which applications are filed. It is seldom that applications for inspection are filed on cars on which complaint has not been made by the receiver. The following figures, therefore, do not represent the average quality and condition of the potatoes received from the states named. They do show with a reasonable degree of accuracy the defects found in protested cars in receiving markets.

Certificates issued on 1341 cars about evenly divided between the states of Maine, New York, Michigan, Wisconsin and Minnesota, have been analyzed. The period covered extended from August 1, 1924 to June 1, 1925. They therefore cover cars shipped both at harvesting time and during the storage period.

Of these 1341 cars, 385 met all of the grade requirements of U. S. Grade No. 1. One hundred sixty-four cars were up to grade aside from decay, which probably occurred in transit, or at least after the grading had been done. Such cars, because of the doubt as to whether the decay developed before shipment or during transit, are described on the certificates as "Up to grade aside from decay." Fifty-five cars were up to grade aside from transit freezing. This type of freezing injury affects the potatoes which are in contact with the bottoms and sides of the cars and sometimes extends as much as six inches up from the floor. Occasionally a car is found in which as much as a third of the contents are frozen. The general improvement in methods of lining and heating cars has reduced losses from this cause during the last few years. Twenty cars which were otherwise up to grade showed chemical injury to the potatoes which were in contact with the floors and sides of the cars. This makes a total of 624 cars which, as far as could be ascertained by receiving point inspection, met the requirements of U. S. Grade No. 1 at time of shipment.

Seven hundred seventeen cars failed to meet the requirements of U. S. Grade No. 1. The following table shows the percentages

of this number of cars which were out of grade principally on account of defects mentioned:

Scab	11.7%
Second growth and growth cracks	12.9
Mechanical injuries, principally cuts and bruises ..	30.8
Hollow Heart	23.2
Size	2.7
Other blemishes	18.7

There was a great variation in the defects found in the potatoes from different states. This was due to a number of causes, chief among which are: weather during growing season, varieties grown, and methods of handling during the processes of harvesting, grading, storing and loading. Almost thirty per cent of the shipments from Minnesota which failed to meet requirements of U. S. Grade No. 1 were out of grade on account of second growth and growth cracks. This was due in all probability to the growing season and to the tendency of the Early Ohio variety, which is grown extensively in the Red River Valley, to develop defects of this character. In Michigan the most serious defect was hollow heart, approximately 60 per cent of the off grade cars from this state going out of grade on account of this defect. In New York, also, hollow heart was the most serious defect, being responsible for approximately 30 per cent of the off-grade cars, wire worm injury coming next in this state, being responsible for 20 per cent of the cars which were out of grade. Eighty per cent of the cars from Maine which failed to meet grade were on account of mechanical injuries followed in most cases by *Fusarium tuber rot*.

It is interesting to note the very small percentage of cars which were out of grade on account of size. The general use of grading machines is largely responsible for the improvement of grading practices in this respect during the last few years.

The other blemishes which were responsible for 18.7 per cent being below grade were principally wire worm, grub injury, and old freezing injury, with an occasional car late in the season out of grade on account of flabby condition due to sprouting.

The tolerance for defects aside from undersize in U. S. Grade No. 1 is 6 per cent. It is interesting to note the percentage of defects in excess of this amount in the cars which went out of grade as shown in the following table:

24.2% of cars showed 2% or less in excess of tolerance
34.2% showed from 3 to 7% in excess of tolerance
21.1% showed 7 to 15% in excess of tolerance
20.5% showed 15% or more in excess of tolerance

It is evident from the above figures that the removal of from 1 to 6 per cent more of defects would have placed more than 50 per cent of these off grade cars within the 6 per cent tolerance. The large percentage of cars which showed in excess of 15 per cent

defects is probably accounted for by the fact that often no attempt is made to accurately grade such cars, it being felt by some shippers that the difference in the price obtained does not justify the loss in volume and the additional expense of the grading operations.

No attempt is made to draw any conclusions from the above figures nor are these figures intended to be the basis for comparison of quality of the potatoes produced by the different states. As stated in the beginning of this article, these figures cover only cars on which requests for inspections were received and so furnish no basis for quality comparisons. They may, however, be of some interest to those who are studying the difficulties experienced by producers, carriers and distributors of this important crop.

POTATO STORAGE AND BLIND TUBERS

(By Dr. Jr. S. J. Wellensiek, Asst. in Inst. Phytopath., Wageningen, Holland; pub. in "Die Kartoffel" No. 16, 1925.)

Translated by W. A. McCubbin

The author notes that blind tubers (Kindelbildung), the development of sprouts into small tubers instead of leafy stems, was the cause of much loss in Holland in 1919 and 1922; in Germany it is of great economic importance also, judging from the notice it has received in agricultural publications. The trouble is most important on early potatoes, and it has been observed in north Holland for about one hundred years. Several early references are given but the author notes that these limit themselves to a description of the trouble and that careful investigations into the cause of it are lacking.

Dr. Wellensiek recognizes two types of kindelbildung, one of which is associated with virus diseases and is comparatively unimportant, and the other he ascribes to environmental conditions, particularly storage and the conditions following planting.

A record of investigational methods and results follows. The first factor taken into consideration was temperature. Several lots of tubers were stored at various constant temperatures and at the end of the storage period each lot was subdivided and planted at different temperatures. The potatoes stored at higher temperatures germinated quicker, so much so that the sprouts had to be removed one or more times in storage. In the lots stored at 9-13 deg. C. (48-55 deg. F.) the blind sprouts developed after planting especially where the after-planting temperature was low. One lot showed this peculiarity at soil temperatures of 3, 6, and 9, deg. C. (37, 43, and 48 deg. F.), but in the plantings of the same lot at 15 deg. C. (59 deg. F.) no sprout tubers formed. He concluded that warm storage and planting in cold soil favors sprout tubers, and that cool storage is unfavorable to their appearance,

even if conditions after planting are favorable to bringing out this abnormality.

There is a close connection between warm storage, repeated sproutings and the development of sprout tubers after planting. The tendency to sprout tuber formation arises during storage through copious sprouting. This conclusion raises the further questions: it is important to know what factors influence germination in storage, and what is their effect after planting; and with what internal tuber conditions is the origin of the tendency to "Kindelbildung" associated. The following factors have a bearing on germination of potatoes in storage: First, there is a difference in the tubers themselves. Next, the previous history may be significant; dryness in the last week of growth stimulates tubers to early germination, but under wet conditions of growth the seed potatoes will develop a general vigorous germination. The average loss of weight following the germination of tubers developed in moist conditions is 39.4% while that of otherwise similarly handled potatoes taken from dry conditions is but 21.6%. If the tubers are dug some weeks before the death of the vines, germination during storage will come sooner and be vigorous. Tubers dug when fully ripe show an average weight loss upon germination of 23.4%. Tubers dug five weeks earlier gave an average loss of 35.2%. Between these extremes there will be observed a gradual transition for intermediate harvest periods.

Small tubers form a comparatively larger mass of sprouts than large tubers, acquiring because of this a tendency to sprout-tuber formation. In the investigations on this point as well as those in connection with soil moisture relations, extremes were employed, since ordinary conditions would not provide sufficiently striking differences.

Of greater significance than the previous history of the seed is the effect of factors in the storage period itself, of these temperature and light being of first rank.

It has been shown that sprout formation becomes correspondingly greater with a rising temperature, and that with sprout formation there is associated a loss of much tuber material and also a tendency to form sprout-tubers. This holds for tubers stored in darkness, but when tubers are stored in daylight sprout formation is hindered to such an extent that removal of sprouts is unnecessary. This is well established by Sachs and others. The author has observed that potatoes stored in light show no tendency to form sprout-tubers while after storage in the dark under quite equal conditions this characteristic appeared in marked degree.

Storage at low temperature is adverse to sprouting but where this is not possible one finds in daylight storage a means of retarding sprouting and at the same time avoiding the tendency to sprout-tuber formation.

Further investigation brings out the fact that the temperature to which the tuber is subject immediately after digging exercises

great influence on its internal processes which precede germination. Potatoes stored immediately after digging at a temperature of 2 deg. C. for two months, and then taken to 10 deg. C. were compared with a second lot dug on the same day and stored at 12 deg. C. Germination took place in the second lot two months earlier than in the first. This observation is important because usually in the beginning of storage the temperature is highest and falls gradually.

It has been shown that if a tendency to sprout-tuber formation is developed in storage, factors after planting will bring it out; low temperature and dry soil after planting are already shown to be capable of this. But it is only a tendency and early planting in cold soil will develop it while late fields in warmer soil will be normal. For Holland conditions it can generally be said that the average storage temperature for early potatoes kept in darkness is not more than 6-8 deg. C. (43 to 46 deg. F.) It is neither desirable nor necessary to plant till April. It is recommended that planting be delayed until soil temperature has risen at least above 6 deg. C. (43 deg. F.)

Another series of investigations also shows the connection between storage conditions and conditions after planting in the production of sprout-tubers. Three lots of tubers were stored in darkness at high temperatures (10, 12 and 16 deg. C.) (50, 54 and 61 deg. F.) After the first sprouts had formed a part of each lot (40 tubers) was planted and the rest kept with the sprouts removed. When a second set of sprouts had formed this was repeated and so on till five lots of sprouts had been grown. Weight loss records were kept at each interval. Planting in each case was done at different soil temperatures and soil moistures. The results of this series showed that the tendency to sprout-tuber formation increased as the sprout production went on. The weak tendency aroused by the first sprout removals showed results only in the plantings in cold soil or dry conditions; as the sprout production increased sprout-tubers appeared at higher temperatures and moister soils until at last the tendency was so strong that external factors had but little influence in preventing it.

A second result from this series was significant. In successive plantings from more and more sprouted tubers the sprout-tuber phenomenon might only appear in the fourth and fifth plantings, but there appeared in the first three as well a difference in the period at which normal tuber formation set in. The more the tubers had sprouted the shorter was the period between planting date and tuber set. One of these series showed a gradual transition from normal tuber set at the proper time to the mere production of sprout-tubers. This set was grown under very dry conditions.

These observations on hastened tuber set are valuable in dealing with the question of what internal changes are brought about

in the seed tubers in consequence of repeated sprout formation so that tuber sprouts are afterward produced.

The water content of a tuber and its first sprout are 75 and 90 per cent respectively. In successive sproutings the sprouts would thus take up from the tuber proportionately more water than solid matter, leaving the tuber more and more poor in water. Finally after continued water loss had raised the relative concentration of the dissolved materials above a certain point, the sprout would have such a high concentration that a tuber would be formed instead of normal growth.

Hugo de Vries has shown that in the normal plant tuber formation results from a heaping up of food stuffs as a result of growth, thus raising the concentration of the cell sap. In the light of this it is apparent that the water loss from the seed tuber is the factor which induces the formation of sprout tubers or hastens tuber set because of the heightened sap concentration. Dry soil is of course a favorable factor in that it permits of the absorption of but little additional moisture to lower the concentration.

A comparison of cell sap concentration in different plant parts can be made by observing the moment at which plasmolysis takes place in cells placed in a plasmolyzing medium. The hairs on potato sprouts were thus tested. Those from a first sprout were affected by a 3.5 per cent solution of KNO_3 while hairs from a fourth set of sprouts required a concentration of 4.5 per cent to produce this effect.

The theory was tested in another way. Tubers with no natural tendency to sprout-tuber formation were dried over calcium chloride with a section of skin removed until they had lost 40-50 per cent of the weight. When planted they developed sprout-tubers. Since this effect took place in tubers which had not sprouted, it appears that water loss alone is a sufficient factor.

Tuber sprouts were also produced without previous sprouting in two cases (a) storage in long exposure to light, three months more than normal; (b) storage in light at a high temperature, 18-20 deg. C. The supposition in both cases is that excessive direct water loss occurred.

Where sprout tuber conditions are present it is quite possible to develop a healthy normal shoot from the plants where the small tuber sprouts in its turn.

PRACTICAL RESULTS

Sprout tuber formation is favored by early digging, small seed tubers, warm storage in darkness, repeated sprouting, and planting in low temperature in dry soil.

Normal development is favored by late digging, large seed tubers, cool storage in full light, absence of sprouting, planting in higher temperature in moist soil.

The most important factors in avoiding sprout-tubers are cool storage, storage in full light, and late planting.

KILLING APHIDS ON ROGUED PLANTS

C. L. Fitch, Ames, Iowa

60.32
Having had considerable experience with the control of mosaic in cucumbers and cantaloupes, I am moved to offer a suggestion relative to the killing of plant lice or other leaf eating or leaf puncturing insects found on potato plants when rogued because of mosaic or other communicable disease or weaknesses.

These insects are not destroyed by the pulling, drying or burial of the plants. They are sure to carry on their bodies any organic disease present in the juices on which they feed, and if roguing remove all diseased plants, they are sure, if left alive in the fields, to feed on healthy plants, and in general are sure to inoculate such plants with the germs which may be upon their bills or mouth parts. Only the removal of plants and insects to a distance from all fields in which seed potatoes are being grown would insure against infection from these insects, and removal is impracticable both because of the work and equipment involved, and because attempted removal serves chiefly to scatter the insects over the field.

The only method indicated by the conditions is to kill all the insects on the plants when and where pulled. This is best accomplished by thoroughly sousing the plants in soap suds—I make it of gold dust—containing a cup of kerosene to each five gallons. The plants should be wrung out so as to minimize the expense of material and labor, and left where pulled or dug.

For vines, I use a half bushel measure with bail and carry about three gallons of kerosene suds with me. Small garbage cans may be had if a larger container be desired.

The suds with kerosene are cheaper than a nicotine suds and the latter is expensive and dangerous to the very life of the person using it.

POTATO MARKETS IN FIRM POSITION

(Contribution from the Fruit and Vegetable Division, Bureau of Agricultural Economics, U. S. Department of Agriculture)

Features of the main potato season to date are the light crop, the early harvest in northern states, the heavy early shipments, and the underlying strength of the market as shown in the quantities being stored by dealers and in the recent advance of prices. There is also a generally firm tone to the seed-potato situation in its relation to expected demands from southern growers.

The October crop report showed little net change from September estimates. About October 10, the most attractive phase of the situation was the rising trend of prices, as indicated by the following figures:

Average Weekly Prices of Potatoes in Key Markets per 100 lbs.

NEW YORK CITY				CHICAGO		
prices to jobbers; bulk Maine Cobblers and Green Mountains				carlot sales; sacked Northern Round Whites		
Week ending	1925	1924	1923	1925	1924	1923
Sept. 5	\$2.12		\$2.45	\$2.00	\$1.50	\$2.10
Sept. 12	2.15		2.30	1.95	1.40	2.00
Sept. 19	2.10	\$1.43	2.15	2.00	1.15	1.45
Sept. 26	2.10	1.30	1.90	2.00	1.05	1.15
Oct. 3	2.30	1.30	1.90	1.80	1.08	1.15
Oct. 10	2.65	1.28	1.98	2.05	.90	1.20

It looked as if the autumn upturn of prices was well started by mid-October, which is several weeks earlier than usual. Trends were decidedly downward at the same time last season, because of the large crop and heavy market supplies. This was particularly true in Chicago, not only last fall but also in 1923. An average decline of about \$1.00 per 100 pounds occurred on that market from mid-September to mid-October, 1923, compared with the fairly steady level of \$2.00 on sacked Northern Round Whites this season. Chicago's average on October 10 this year was slightly above \$2.00, as against 90 cents a year ago and \$1.20 in 1923. Bulk Maine Green Mountains were jobbing in New York City at \$2.65, compared with \$1.30 last season and about \$2.00 in mid-October, 1923. New York and Pennsylvania Round Whites recently ranged \$2.25-\$2.50 in eastern consuming centers, and sacked Long Island Green Mountains touched \$3.35 per 100 pounds in New York City. The same variety in sacks from Maine reached \$3.00. Chicago carlot sales of Minnesota Red River Ohios had advanced to top of \$2.50, with Idaho Rurals bringing \$2.30 and Russets 30 cents more than Rurals. Texas carlot markets quoted Colorado potatoes sharply higher at \$2.50-\$2.75, and California sacked Burbanks reached high mark of \$3.60 in Dallas.

Eastern and North Central f.o.b. quotations maintained a range of \$2.00-\$2.35, with the Aroostook County, Maine, market especially strong. Growers in Colorado and western Nebraska were getting from \$1.50 to \$1.70 per 100 pounds, and there was a tendency to hold for higher prices. Winter weather conditions were already appearing in some parts of the West. As car shortage was affecting shipments from Idaho, the cash-track price in that territory closed firm on October 10 at \$1.40-\$1.80, according to variety and pack. Most of the f.o.b. sales of potatoes ranged \$1.00-\$1.50 more than those of last October. Peak of Minnesota shipments was reported to have been passed, though average daily movement may continue around 200 cars until the middle of November. Only one-third of the Red River Valley crop remained

to be dug; dealers were storing freely, especially stock suitable for seed. Frosts probably caused 5 per cent to 10 per cent damage to tubers still in the ground. Wisconsin reports one of the best quality crops in recent years. Growers and shippers in that state were optimistic.

Total shipments of potatoes during the week ending October 10 filled slightly more than 7,000 cars, compared with 6,600 the same week last season, 9,500 in 1923, and 8,100 in 1922. Peak of potato movement in 1922 occurred during the last week of October and in 1923 during the second week of October, while 1924's heaviest shipments were again in the last part of the month.

October forecast indicated a total of 344,227,000 bushels of potatoes, or only 164,000 less than estimated in September, but 110,560,000 less than in 1924. Damage from blight was reported in some sections. New York State had excessive rainfall during September, and rot was affecting a considerable number of fields. Important decreases in the crop report since September 1 were 2,835,000 bushels in New York, 360,000 in Minnesota, and 460,000 in Washington. Pennsylvania showed an increase of 1,350,000 bushels, Colorado 1,115,000, Idaho 615,000, and Maine 420,000 bushels. Lighter crops in some of the North Central States were not compensated by the gains in others, so that the North Central region as a whole expects 430,000 bushels less than in September. The decline in Washington is offset by heavier production in Oregon and California combined. Based on the July population estimate of 113,493,720 persons in the United States, per capita production of potatoes appears to be about 3.03 bushels, as against an average of 3.77 for the past 20 years and 4.07 bushels in 1924.

POTATO NOTES INCLUDING CERTIFICATION

Colorado.—The car lot shipments from Colorado will be about the same as last year or possibly a little less. The San Luis Valley will ship about a normal crop, or about 4000 cars. The Western Slope of Colorado will probably be slightly under normal, possibly a reduction of 10 per cent. The car lot shipments from the Greeley District will probably be a little less than in 1924. Harvesting of the late crop has not yet begun but vines are beginning to ripen and a killing frost may be expected at any time. The quality of the crop in the Greeley District will be much better this year than last. The quality of the 1924 crop was rather inferior owing to heavy rains which occurred in September causing considerable growth crack and hollow-heart. The 1925 crop of the Greeley District is about 1000 acres less than the 1924.—**W. C. Edmundson, September 30.**

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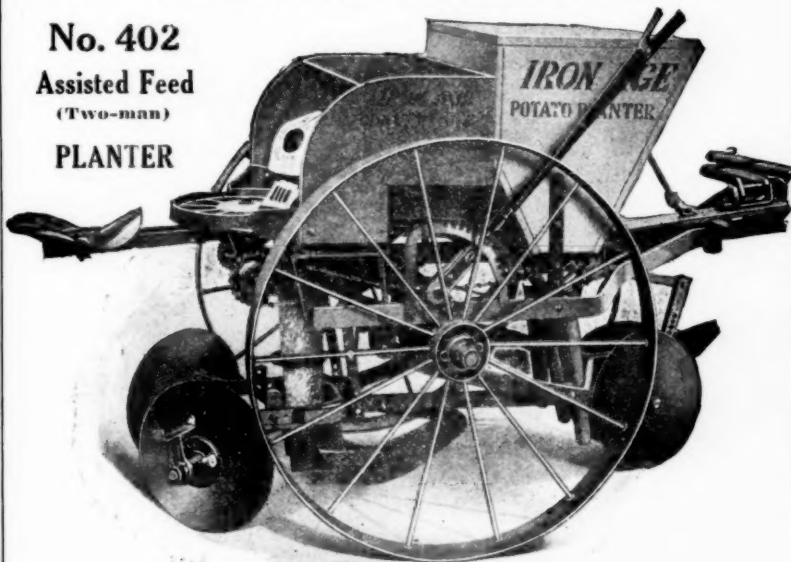
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Write for catalogs describing these machines, also Garden Tools and Horse Hoes & Cultivators.

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Western Nebraska.—The total western Nebraska potato crop will probably be below normal. In the dry land regions the yield per acre will be relatively high. In the irrigated regions the per acre yield will be about normal or perhaps slightly above. The type of tubers in the irrigated region is very good. In the dry land regions the quality is variable. In a number of fields there have been serious outbreaks of early blight. Scab is more common than usual.

Fusarium infection (*fusarium eumartii*) causing stem end discolorations or stem end rot is prevalent to a serious extent in some lots of potatoes. Spindle tuber has apparently been very greatly reduced in the certified seed fields. *Rhizoctonia* was very prevalent in the fields during early August but practically none of the tubers have any sclerotia.

The seed potato market is unusually active at an early date. The certified seed growers have contracted a large quantity of seed potatoes for sale at prices ranging from \$2.00 to \$2.65 per cwt. for November to December delivery. The market seems to be advancing rapidly. Uncertified seed potatoes are selling around \$1.67 per cwt. Several extensive southern buyers who previously bought certified seed rather sparingly are buying it almost exclusively this year.

The Nebraska Potato Improvement Association will hold its annual convention and show at Kimball, on November 12 and 13.
—H. O. Werner, October 6, 1925.

Nova Scotia.—The total acreage of potatoes entered for inspection this year was 301. Of this total, 97 acres failed to pass. The acreage which passed inspection was as follows: Garnet Chili, 113; Irish Cobbler, 84; Green Mountain, 2; Dakota Red, Blush and Early Rose, 5.

The greatest failure was in the Green Mountain variety, only two acres out of sixty-six passing the two percent standard for mosaic, even after careful roguing. However, many growers have excellent seed plots which will yield fine stock for 1926 planting.

Black leg and leaf roll accounted for most of the failures in the other varieties. Black leg was more severe than usual this season, but a marked feature was the success of cold formalin treatment. Hitherto few had tried seed treatment, but a number of growers were persuaded to try it out, and in no case where this was done, did the percentage of black leg exceed 1.5 per cent. In one field one-fourth of the area was planted with untreated seed which showed nearly 6 per cent black leg while the remainder planted with treated seed showed less than 1 per cent.

Misses were more numerous than usual. Continued heavy rains occurred after planting apparently causing many of the weakest sets to succumb. At any rate on many farms where misses were in evidence, seed plots planted with sets, taken from sound undamaged tubers and showing vigorous eyes, gave almost perfect stands of plants.

MCCABE BROTHERS

GROWERS AND SHIPPERS

RED RIVER CERTIFIED SEED POTATOES

SABIN, MINNESOTA

Early blight was quite severe this season. In consequence the Irish Cobblers died earlier and therefore are giving lighter yields but so far little or no rot is in evidence. The same cannot be said of the later varieties.

Late blight appeared in the latter part of July, but was checked by dry bright weather throughout the whole of August—during which time the early blight finished off the early varieties.

Heavy rains occurred from the middle to the end of September, and late varieties now being harvested show a considerable amount of rot, which it is feared will show up much worse in storage.
—**W. K. McCulloch, Oct. 2.**

Harvesting of main crop is well under way. Western parts of the Annapolis Valley report light yields and much rot. Eastern parts of the Province report light yields. Central points have fair to good yields and good quality. Would judge the main crop as an average yield with slightly more rot. Prices for table stock are around \$2.50 per barrel.—**J. F. Hockey, Oct. 2.**

Ontario.—Field inspection for certified seed potatoes were completed by September 20th, the returns indicate that 300 acres more passed the two field inspections this season than last year in Ontario.

In the eastern counties late blight was responsible for the rejection of many fields. The Western counties were apparently not troubled with this disease to the same extent as last year and the northern seed growing centers are practically free from late blight trouble this season. Rhizoctonia injury and black leg has given rather more trouble than usual in the north this year, probably due to weather conditions being favorable for the development of these diseases. However some northern districts, notably the Burriss district in the Rainy River territory still remains practically free of black leg.

There will be a large quantity of excellent certified Irish Cobblers available for early fall shipments from the Burriss, Dorion, Sudbury, Massey and Hillsburg districts, very fine Green Mountains from Dorion, Massey, and Hillsburg districts and many cars of Dooleys (R. N. Y. type) from Simco County.

The prices now being paid for table stock in the late potato sections show considerable improvement. This is very gratifying to the growers who usually see quotations going the other way at this season, demand from outside sources is given as one reason for the rise, considerable quantities have already been exported and the demand remains excellent.

Many boosters for the hill selection method of improving seed potatoes have been met this season, J. A. Ross of Searchmont is one of them. Mr. Ross in one small seed plot dug 182 lbs. of potatoes of excellent type from the seed tubers saved from one hill of Green Mountains last year, growers who have returns like this need no coaxing to continue seed improvement work.

I observed a rather phenomenal condition in potatoes in one district in the north this season. On the 24th of August, I dug some hills of late planted potatoes. The plants were still in blossom and had new potatoes up to around 8-10 ounces in size on them, these potatoes had sprouted from every eye, sprouts averaged an inch long and some of those from the seed end were nearly six inches long, in some cases small potatoes had formed again on the sprouts, twenty-five hills out of forty dug in one field were this way, the same condition was observed in two other fields in that district.

Extra long rhizomes have been found on the potatoes in many fields in the north this year; some three, four, and five feet long were frequently seen.—J. Tucker, Oct. 1.

Prince Edward Island.—The following is an interesting report of the field inspection of potatoes for certification in 1925. There were 1880 fields inspected with a total acreage of 7331 acres. After the field inspections were made it was found that 6515 acres had passed or **88.8 per cent.**

Record of the principal diseases found in the fields inspected—

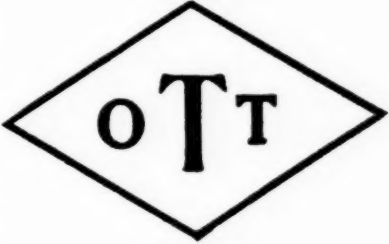
	Black leg	Leaf roll	Mosaic	Wilts
Average per cent of disease in total fields inspected	.381	.030	1.165	.068
Average per cent of disease in fields passed	.326	.004	.251	.060
Average per cent of disease in fields rejected	.060	.058	5.240	.072

Reasons for rejection of fields were: blackleg 29 fields, leafroll 3, mosaic 183, wilt 0, foreign 16, lack of vigor 12, proximity to diseased fields 2, insect injury 2, and early blight 5 fields.

Number of acres of Irish Cobblers passed 4191, Green Mountain 2316 and other varieties 8 acres. Number of acres of Irish Cobblers rejected 132, Green Mountains 653 and other varieties 30 acres.

The fields which this year passed the inspections for certification were in remarkably good condition and showed a very low percentage of disease.—H. T. Gussow, Dominion Botanist, Sept. 22.

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Inspected and certified by the N. J. State Department of Agriculture with 4 inspections, using rigid and high requirements for certification.

A productive and disease-resistant strain which will stand comparison.

Prices in car lots upon application.

Frank L. Ott, Chairman of Sales Committee
R. F. D. 5, Bridgeton, New Jersey.

Editorial note—The above report is worthy of careful study. It denotes progress is being made under rigid inspection regulations.—**W. M. P.**

Vermont.—The season in Vermont has been a trying one for certified seed growers as well as for all growers of table stock potatoes. Continued rains during the early part of the season promoted a large growth of vines and at the same time interfered with thorough spraying. Late blight began to appear during the latter part of July and by the middle of August the vines in many unsprayed fields were dead.

The rainy period was followed by several weeks of dry sunshiny weather which entirely checked the blight. This was too late, however, for many fields, and of the total acreage inspected, 834, only 479 acres were certified. A very large percentage of the disqualifications were for late blight and this fact is not without significance since it means that through the distribution of the more disease-free strains for seed and the use of isolated seed plots, foliage diseases are being reduced in Vermont.

Yields will be materially less than last year and while the certified acreage in 1924 yielded at the rate of 325 bushels per acre, this year the average yield is estimated at not over 250 bushels.

Weather conditions favoring the development of tip burn were present this season to an unusual degree and much more injury

from this cause was observed than is usual in Vermont. Leaf hoppers were also more abundant than previously and there was perhaps quite as much foliage injury due to "hopper burn" as to "tip burn."

In the matter of spraying, generally speaking, where the pressure was inadequate and thorough covering was not secured, the vines went down, while due to the difficult weather conditions there was some blight even in the presence of very thorough spray applications. It is likely, however, that many of the failures to hold the vines free from blight were due to delay in the initial sprays.

Vermont seed enjoys a reputation in the seed markets for high quality as is indicated by the prices which Vermont growers receive, Prince Edward Island being our strongest competitor.

Plans for next year include the carrying on under the auspices of the Vermont Experiment Station of several experimental fields to furnish material for the more adequate study of giant hill and spindle-tuber and for the demonstration of the tuber unit method as a means of maintaining disease-free stock.

Another step that Vermont growers are contemplating is provision for local storage so that seed may be held for spring delivery under uniformly favorable conditions. Much of the Vermont certified seed is grown at some distance from the railroad and transportation in the spring is difficult. Moreover local storage conditions are not always satisfactory. The present prospects are that there will be little Vermont seed available in the state next spring. Most of it will be absorbed this fall.

Present prices recommended by a price committee of the state association and state wide in application are, for immediate quotation, \$1.65 per bushel, f. o. b. local stations, for several car lots, and \$1.75 for single cars or less.—**A. H. Gilbert, October 1.**

West Virginia.—There is only a light crop especially in southeastern part of state due to extreme dry weather during growing season.

The early crop in the Ohio Valley was fair and where good methods were used a good yield was harvested.

In the higher altitudes, where late crops are grown good practices here also gave good returns.

As a whole our crop will be short at least 25 per cent.

We have marketed through the West Virginia Cooperative Potato Growers' Association which is a part of our Farm Bureau program upward of 50 cars during the last two months. These have been handled through our local wholesale companies supplying their needs.—**Dee Crane, Potato Specialist, Sept. 28.**

Wisconsin.—The Wisconsin Potato Growers' Association wishes to make the following report on the annual Potato Tour which started at Oconto on August 10 and covered the following counties:—Oconto, Marinette, Forest, Langlade, Oneida and Vilas.

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INFORMATION TO

ALFRED H. GILBERT, Sec'y-Treas.

Vermont Certified Seed Potato Growers' Association
Burlington, Vermont

Mosaic Control. Special interest was manifested by growers and shippers in Wisconsin on the results of the work the Experiment Station is doing in the control of the mosaic disease on the Triumph variety. Several growers in the territory covered by the tour have planted seed stock this year from which the mosaic disease has been removed. The healthy appearance of these seed plots was very gratifying as shown by the field inspections made during the tour. The Triumph seed trade is an important part of the seed potato industry of Wisconsin and representatives of the seed potato markets of the country are watching this work with very much interest. The results of the work to date indicate that Wisconsin growers will be able eventually to hold this disease down to the low minimum now desired by potato growers and distributors in the truck growing sections of the South and East.

Special problems involved in the trade on other varieties were also covered in the field meetings arranged along the line of the tour. Among the interests who appeared on the field programs and discussions were representatives of loading railroads, potato growers, potato shippers, state department, and manufacturers of machinery, equipment and supplies.

The field inspections made on the tour show that, barring unforeseen developments during the late season, the quality of Wisconsin

seed and table stock will be excellent this year. The tonnage and acreage is lighter in most sections than in 1924.

In certain districts covered, harvesting operations on a small scale had started with early varieties. Apparently, Wisconsin growers and shippers are aware of the danger of forcing too much green stock on the market during the early fall period. Such practical measures as can be taken to limit the shipment of green stock will no doubt be followed by Wisconsin potato interests this year. There is in evidence in Wisconsin, also, as shown in the territory covered by the tour, a more pronounced tendency toward careful handling of both seed and table stock.

The Wisconsin Potato Show and Annual Convention. At the beginning of the tour a meeting of farming and business interests was held in the city of Oconto to make preliminary arrangements for the annual Wisconsin Potato Show and State Convention to be held at Oconto during the week of November 2 to 7. Another committee meeting will be held at Oconto on August 20. Both farming and business interests of the county are cooperating with the Wisconsin Potato Growers' Association. There is much evidence to believe that this will be the largest potato show and state convention ever held in the state. It is expected that about twenty Wisconsin counties will be represented. In addition to the regular competitive classes, there will be included also a commercial section representing manufacturers of machinery, equipment and supplies. The Wisconsin seed potato industry will also be featured, both by exhibits and by a special feature program covering seed potato producing problems. It is expected also that representatives of important seed potato and table stock markets of the country will be in attendance. Preliminary program, announcements and premium lists will be issued early in September. For information, write J. G. Milward, Secretary, Wisconsin Potato Growers' Association, Madison, Wisconsin.—**J. G. Milward, Sec'y. Sept. 28.**

POTATO MEETINGS

- Oct. 29-31, 1925—Michigan Potato Growers' Association at
Greenville, Michigan
- Nov. 3-6, 1925—Wisconsin Potato Growers' Association at
Oconto, Wisconsin
- Nov. 4-6, 1925—Kansas Potato Growers' Association at
Topeka, Kansas
- Nov. 12-13, 1925—Nebraska Potato Show at Kimball, Nebr.
- Nov. 17-20, 1925—Pacific Northwest Potato Show at
Spokane, Washington
- Nov. 25-28, 1925—British Columbia Potato Show and Educational
Seed Exhibit at New Westminster, British Columbia

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THE KANSAS CITY CONVENTION

H. O. Werner, Chairman Program Committee

The annual convention of the Potato Association of America will be held at Kansas City on December 29, 30 and 31 in conjunction with the A. A. A. S. and affiliated societies.

The program committee is not prepared at this time to present details concerning the program, but hopes to do so in the next number of The Potato News Bulletin.

Definite arrangements have been made for a joint session with the Phytopathology Society of America. This session will be devoted to potato diseases. It is being arranged for by Dr. Barrus of Cornell. This joint session will be held on Wednesday afternoon, December 30. This session will be quite largely devoted to degeneration diseases and black leg.

One session will be devoted to seed potato certification. Phases to be discussed are field conferences of inspectors, certified seed trial plats, administration, seed plat practice, regional certification problems and protection of certified seed against fraud. The program for this session is being arranged by Dr. W. M. Martin of New Jersey. If necessary, there will be an evening meeting of all men directly concerned with seed certification, for the purpose of working out the policy of the association regarding certified seed and a national name or brand for certified seed.

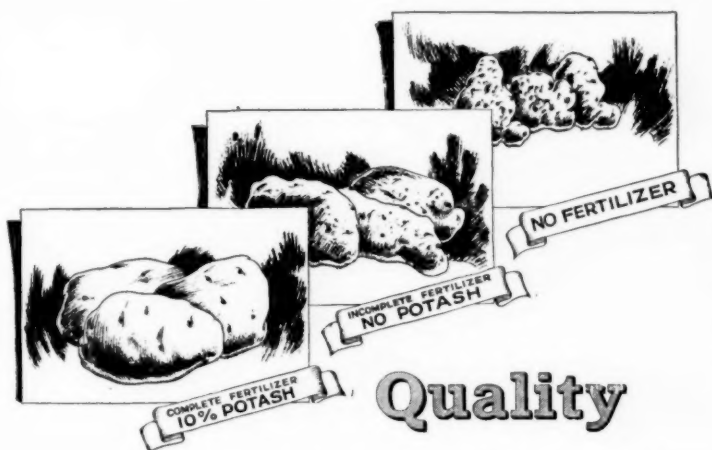
Another session will be reserved for consideration of the various seed potato disinfection methods, i. e. hot and cold formaldehyde, corrosive sublimate, organic mercury compounds etc.

Papers along the line of physiological research, cultural studies, field technique etc., will be presented in one or two additional sessions.

NOTES ON RECENT LITERATURE

ALBRIGHT, W. D.—Potatoes.—*Canada Expt. Farms, Beaverlodge (Alta.) Substa. Rpt. Supt. 1923 (issued in 1925), pp. 20-30, fig. 1.*

Investigations with potatoes at the Beaverlodge, Alberta, Experimental Substation showed Early Rose to continue to rank high as an early potato, rather excelling Early Ohio in yield, size, and edible quality. Other good early sorts included Houlton and Everitt Rose, Early Hebron, Extra Early Eureka, Bovee, and Country Gentleman. A special susceptibility to autumn frost injury was shown by several white varieties, notably Carman No. 1, Gold Coin, and Empire State, which sustained about 14 or 15, 10, and 8 per cent of injury, respectively. Curiously enough, the red potatoes, most of which cluster about the base of the vines, escaped with a trifling percentage of loss.



The use of sulfate of potash produces tubers of clearer appearance and of more uniform size—Many soil and crop authorities report.


The above illustrations, taken from actual photographs of potatoes grown by L. E. Davis of Van Buren County, Michigan, show the value of sulfate of potash.

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The new booklet, "Better Potatoes," which contains actual photographs and facts, is now being sent to potato growers. To get your copy, write to the address below.

Improve the quality of your potato crop next season. Ask your dealer to supply you with a mixture containing plenty of sulfate of potash.

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The average results of time of planting tests during 6 years signified the importance of taking rather full advantage of a rather slow growing season, either by early planting or by sprouting or by both, although in certain seasons planting strongly-sprouted sets too early may partially defeat the object by obtaining too large a proportion of the vine growth in a period of unfavorable weather.

Evidently it is better to leave the cellar sprouts on the seed sets, for in 6 years' trial the average disadvantage of breaking them off amounted to 22.4 per cent. Comparison of no sprouts v. white sprouts v. green sprouts on sets seemed to suggest keeping the seed tubers dormant until about April in a cool, dark root cellar and then treating them with fungicide and allowing the potatoes to form green sprouts in a light, frost-free room. Removing all eyes but one per set from green sprouted tubers planted whole resulted in an average loss of 4.77 per cent during 5 years. Seed ends of the tubers have produced yields averaging 7.1 per cent better than stem ends. Yields during 4 years have favored medium shallow rather than deep planting, even in droughty years.—H. M. Steece.

ANONYMOUS.—Potato certification.—*North Carolina Sta. Bul.* 247 (1925), p. 32.

To develop a source of good seed which could be properly inspected and certified to insure freedom from disease, potatoes were grown in western North Carolina at altitudes of over 3,000 ft., since the climate of these higher elevations simulates that of the Northern states. It was found that potatoes of excellent quality could be grown in the mountains and when used as seed in eastern North Carolina such tubers compared very favorably, over a period of several seasons, in earliness, yield, and freedom from disease with certified seed from Maine.—H. M. Steece.

ANONYMOUS.—Potatoes.—*Rothamsted Expt. Sta., Harpenden, Ann. Rpt. 1923-1924*, pp. 21, 22, 120, 121.

Applications of potassium sulfate and of potassium chloride to potatoes at Rothamsted, England, gave similar results as regards yields. Addition of other chlorides, such as common salt, to plats receiving chloride was injurious, neither kainit nor sylvinite giving the full benefit expected. Manure alleviated the adverse effect slightly. Of the plats receiving complete fertilizer, those getting potassium sulfate produced tubers containing the most dry matter. The tubers produced with low-grade potassium salts (kainit, sylvinite) had the least dry matter, even less than those grown without potassium. The percentage of starch in the dry matter was higher for the potassium sulfate plat than for plats receiving the other salts. The beneficial effect of magnesium sulfate on potatoes at several centers was unexplainable.—H. M. Steece.

PATE, W. F. AND J. J. SKINNER.—Fertilizer experiments with Irish potatoes.—*N. C. Dept. Agr. Bul.*, 1924, Sept., pp. 53-69, figs. 5.

Fertilizer experiments with potatoes on the Dunbar fine sandy loam in Craven County, N. C., made by the North Carolina Experiment Station in cooperation with the U. S. Department of Agriculture, gave results showing that for growing potatoes on this type of soil a complete well-balanced fertilizer is required. A mixture carrying 6 to 7 per cent phosphoric acid, 4 to 5 per cent ammonia, and 4 to 6 per cent potash would seem logical when all factors are considered. Other tests on this soil showed that the potash fertilizers have given larger yields than those containing no potash, and that as much as 1,800 lbs. of fertilizer per acre can be used profitably.

In a study of the effect of fertilizers of various ratios on the yield of potatoes on Portsmouth sandy loam it appeared that for best results on this soil, a fertilizer for potatoes should contain phosphoric acid, ammonia, and potash in nearly equal proportions, the percentage of potash being somewhat lower than that of the other nutrients. A mixture containing 6 to 7 per cent phosphoric acid, about 6 per cent of ammonia, and 4 to 6 per cent potash should be suitable.

In experiments to determine the relative effects of several sources of potash on potatoes, a wide difference was not apparent in the effects of potassium sulfate, potassium chloride, and Nebraska potash salts on the Portsmouth sandy loam. For the Dunbar fine sandy loam, however, the data point to a preference for the potassium sulfate, but the increased yield secured from the sulfate over the other materials is not large enough to justify its use if its cost greatly exceeds that of other potash materials.

On the Dunbar soil, organic nitrogenous materials with mineral nitrogenous salts gave better results than did the use of mineral nitrogenous salts alone; this was especially marked where cottonseed meal and blood were used as the sources of nitrogen in the mixtures. On the Portsmouth sandy loam sodium nitrate as the single source of nitrogen gave as good results as did those mixtures containing both mineral and organic sources.—**H. M. Steece.**

McINTOSH, I. P.—Potato tubers and sprouts; their value in identifying varieties.—*Journ. Ministry Agr. (Grt. Britain)* 32: 250-261, 1 Fig., June, 1925.

60.8
The identification of certain potato varieties is acknowledged by the author to be a matter of extreme difficulty and it often becomes necessary to study the tuber characters as well as the above ground parts of the plant. In other words, in such cases it is necessary to consider the plant as a whole. The tuber shape, skin, flesh and sprout characters all furnish material help in the identification of varieties. A rather comprehensive description is given of morphological development of the tuber including its proximity

to the parent stem and relative position with respect to its sister tubers. It is claimed that in general early varieties form tubers near the parent plant, while some have a disposition to deep tuber formation. The color of the scale leaves, especially in white skinned tubers, afford a valuable feature in their identification. Many varieties are cited.

The shape of the tuber is also considered as a valuable character in identification work. Mature tubers must of course be used for this purpose. Tuber character persisting after maturity that are regarded as useful in diagnosis are: (1) shape, (2) color, (3) position and depth of eyes, (4) color and consistency of the flesh, (5) type of second growth, and (6) microscopic characters.

Shape. The following general tuber shapes are recognized: round, long, oval, conical or pear shape.

Color and condition of the skin. Tubers may be colored, parti-colored, white or russet. The student is cautioned in regard to using immature tubers as the color is only fully expressed in mature tubers. The character of the soil also influences the color: hence these factors must be considered. In sandy and peaty soils higher color is developed than in clay soils. The author claims that the term white as applied to skin color is used commercially to include a wide range of yellow shades which may be differentiated by the shade of yellow. Russet skins offer an easy means of identification.

Position and depth of eyes. The tubers of most varieties have their eyes largely concentrated at the apex or bud-eye end. Some varieties have distinct swellings below each eye. These are what are known as "raised eyebrows."

Color and consistency of the flesh. Flesh color like skin color is only fully developed in the mature tuber. Varieties are described as having yellow, pale yellow and white flesh. The flesh may be either soft or hard. Generally speaking early varieties have soft flesh and late ones hard flesh but exceptions have been noted.

Type of second growth. Several distinct forms of second growth are noted which are regarded as peculiar to certain varieties. These are: cracking, formation of secondary tubers, protrusions from tuber eyes and prolongation of the tuber axis. Varieties having these various peculiarities are cited.

Microscopic characters. The ability to produce a large percentage of large starch grains would appear to be varietal. The Shamrock and Great Scot are cited as having large average starch grains, while Early Rose and Kidney have small average grains. In making these comparisons it is necessary to use similar sized tubers and to examine similar areas.

Sprouts. Distinct differences in varieties may be noted in the thickness of the sprouts. In darkness long etiolated sprouts are formed in which the color, if any, is very faint and confined to

the lenticels. Moisture is thought to inhibit the development of pigment. In diffuse light the sprouts do not grow to the same extent, but the coloring is much more marked being partly green and partly red or blue purple. Grown in diffuse light the color of the sprout may be, (1) faint pink, (2) pink, generally on a white or greenish-white ground, the color of the tip being similar to the color at the base, (3) blue or blue purple, when the tip and base are always a shade of blue.

The following color correlations have been noted:

- (1) All plants having blue or blue purple predominating in the flowers have blue or blue purple sprouts.
- (2) All plants having red or red purple predominating in the flowers have pink sprouts.
- (3) The color of the sprout corresponds with the color, if any, on the tuber itself, including the scale leaves, or on the underground runners.

The hairiness of the sprout may also be used in separating varieties. They may be grouped as follows:

(1) Hairs frequent, (2) hairs few. Examples are cited in each case. On pages 260 and 261 tubers are classified under the following general headings: (1) White tubers, (2) Red tubers, (3) Purple tubers, (4) Parti-colored tubers, (5) Russet tubers. The various sub-headings under white tubers presented below will serve to represent the other color groups.

White tubers	Round	White flesh	{ Pebble shaped Spherical shaped
		Yellow flesh	{ Spherical shaped
	Long	Oval	{ White flesh (Short, Long) Yellow flesh (Short)
		Pear-shaped	{ White flesh Yellow flesh Pale yellow flesh
		Conical	{ White flesh

The varieties belonging to each of these respective divisions are given thus affording a ready guide for those wishing to determine the identity of a variety.—W. Stuart.

WERNER, H. O.—The Spindle Tuber Disease; One cause of "Run Out" seed potatoes.—*Nebraska Bul.* 207, April, 1925.

This bulletin summarizes in a popular way, most of the work on "running out" of seed potatoes conducted by the horticultural department of the Nebraska station during the period from 1917 to 1924. A more complete report of this work is contained in Nebraska Research Bulletin No. 24 which is now in the process of publication.

Spindle tuber has been found in all varieties tested. A description of the symptoms is given. Tubers of several varieties in various stages of infection are shown. Charts are present to show the effect of the disease upon yield, size, and tuber type. Infection experiments reported showed infection to the extent of 10 to 25 per cent in one year as being very common and 80 to 100 per cent as not at all unusual. Spindle-tuber has been observed to commercially ruin many lots of potatoes in from one to three years.

The disease seems to spread more rapidly in irrigated than in dry land regions. In eastern Nebraska it appears to develop less extensively in straw mulched than in cultivated lots. Late planting resulted in a somewhat decreased amount of infection, according to the environment. Early harvesting was of very little or no value in escaping tuber infection.

Selection of good type tubers from infected strains was generally of no value as a control measure. Roguing was not effective in lots containing a high percentage of the disease.

On the basis of data reported in the popular and research edition the control measures recommended are:

- (a) Selection of a good strain of seed potatoes as free as possible from this and other diseases.
- (b) Selection of the best type tubers for planting in a seed plat.
- (c) Isolating this seed plat from all other fields by a distance of at least 300 feet.
- (d) Roguing this plat severely, early and frequently, removing all suspicious looking plants.
- (e) Selection of tubers of best type produced in this plat for use in the seed plat the following year and using the remainder of the potatoes for the commercial planting.—H. O. Werner, October 6, 1925.



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